



## Biofertilizers (vermicomposting) as sustainable alternative to urea application in the production of basil (*Ocimum basilicum* L.)

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### INTRODUCTION

In a context of sustainable agriculture, the process of organic basil production requires investigations, which determine the effects of vermicomposting on seedling production.

The antecedents indicate that these biofertilizers produce a horticultural yield increase (Atiyeh *et al.*, 2000, 2001) so much of fresh as dry matter (Ullé *et al.*, 2000), of weight and number of fruits, as well as of calcium and vitamin C content (Premuzic *et al.*, 1998).

The aim of this work was to evaluate the effects of two biofertilizers (vermicomposts from agricultural and agro-industrial solid residues) as sustainable alternative to urea application in the production of basil seedlings (*Ocimum basilicum* L.) var. Catamarca Inta (Wide Leaf) in counter season.

### METHODOLOGY

Sowing was carried out in autumn in greenhouse. Treatments were: vermicompost from bovine ruminal contents 50% in mixture with 50% soil, vermicompost from rabbit manure 50% in mixture with 50% soil, urea 100 kg/ha, and standard 100% soil.

The variables seedlings Height and Number of leaves were determined weekly. At the end of the cycle, Total Fresh and Dry Weight, Aerial and Radical Weight (g), Number of Branches and Foliar Area (cm<sup>2</sup>) were also evaluated. A physical and chemical evaluation of the substrates was carried out.

A completely randomized design was carried out, with thirty plants per treatment. With regard to Height, and Number of leaves the profiles of mean

values reached through time were graphed. The remaining variables were analysed by an ANOVA, and the comparison of means was carried out by LSD Fisher ( $p < 0.05$ ).

### RESULTS AND DISCUSSION

The height of the seedlings was significantly higher in urea than in the other treatments until 36 days from the emergency, while at 85 days treatments with vermicomposts produced seedlings significantly higher than standard and urea.

With regard to the number of leaves, from 78 days after the emergency, seedlings treated with vermicompost showed significantly higher number of leaves than those with urea and standard (Fig. 2). Different letters indicate significant differences ( $p \leq 0.05$ )

Treatments with the used vermicomposts increased significantly ( $p < 0.0001$ ) all production variables in comparison with urea and standard. However, significant differences were not detected between both vermicomposts, except for the variable number of branches, which was higher ( $p < 0.0001$ ) in the treatment with rabbit manure vermicompost (Table 1).

In agreement with the previous results, the physical-chemical evaluation of the substrates showed that both vermicomposts possessed higher content of nitrates and Ca + Mg, and duplicate the organic matter percentage than standard. The comparison between the used vermicomposts indicated that that of rabbit manure showed the highest contents of nitrates, phosphates, sulfates and Ca+Mg (Table 2).

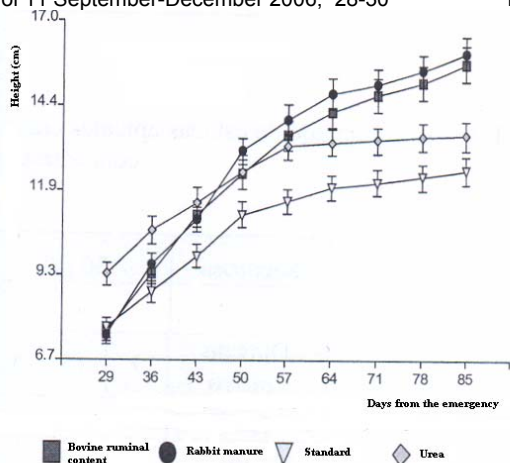


Figure 1. Height of basil seedlings growing in different substrates.

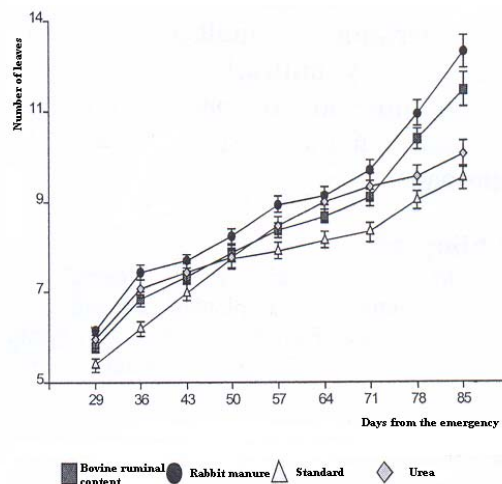


Figure 2. Number of leaves of basil seedlings growing in different substrates.

Table 1. Variables of basil seedling production under vermicomposting treatment (from rabbit manure and bovine ruminal content), of urea, and standard at 85 days after the emergency.

Treatment	Height (cm)	Number of leaves	Number of branches	Aerial FW (g)	Root FW (g)	Total FW (g)	Aerial DW (g)	Root DW (g)	Total DW (g)	Foliar Area (cm <sup>2</sup> )
Standard	12.47 A	9.80 A	7.06 A	3.12 A	0.88 A	4.00 A	0.43 A	0.21 A	0.64 A	68.52 A
Urea	13.52 A	10.40 A	7.70 A	4.00 A	1.28 A	5.28 A	0.61 B	0.47 B	1.08 B	87.46 A
Bovine ruminal content	15.69 B	12.00 B	8.60 B	5.93 B	3.47 B	9.40 B	0.70BC	0.86 C	1.55 C	133.28 B
Rabbit manure content	16.03 B	12.95 B	9.40 C	6.49 B	2.95 B	9.44 B	0.77 BC	0.75 C	1.51 C	148.96 B

Table 2. Physical and chemical evaluation of vermicomposts mixed with soil (1:1), and standard.

Quality indicator	Standard	Rabbit manure vermicom-post mixed with soil (1:1)	Ruminal content vermicom-post mixed with soil (1:1)
% Organic matter	1.90	3.83	3.96
pH in water 1:1.25	6.1	6.0	5.9
Nitrates (ppm)	74	191	131
Phosphates (ppm)	693.05	701.4	417.5
Sulfates (ppm)	250	230	212.5
Ca+ Mg (me/100 g)	0.56	7.31	4.76



### CONCLUSIONS

It can be drawn the conclusion that the use of biofertilizers (vermicomposts) showed beneficial effects on the production of basil seedlings in counter season, representing a sustainable alternative to urea application.

Note: This study was presented at the 'I Reunión de Biotecnología aplicada a plantas medicinales y aromáticas' (First Biotechnology Meeting on Medicinal and Aromatic Plants), Córdoba, Argentina, 2006.

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